

# PATENT ABSTRACTS OF JAPAN

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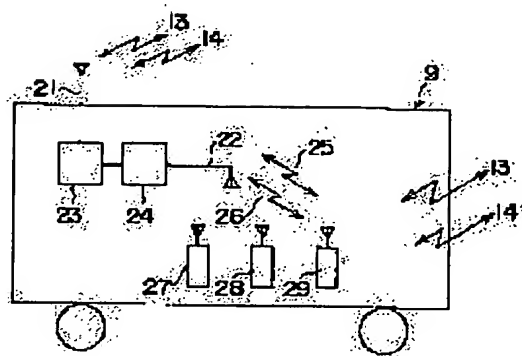
## (54) MOBILE COMMUNICATION SYSTEM OF CELLULAR SYSTEM

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To decrease the number of position registering times by representing the position registering requests given from plural mobile stations moving as a single group via the position registering operation of a base station directed transmitting/receiving device of a mobile object.

**SOLUTION:** A user of a mobile station 27 is getting on a train 9 at a station and is going towards a service area. When the user reaches a specific place after riding on the train 9, the station 27 searches for a control channel that can be received at the highest level, in response to the deterioration in the level of a control channel received from a base station.

Meanwhile, a mobile station directed transmitting/receiving device 24 of the train 9 supplies information on a virtual service area into the internal space of the train 9 via a down control channel 25. The station 27 catches the channel 25 which has the highest level among those receivable control channels and regards the device 24 as a virtual base station and performs a position registering operation.



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**CLAIMS**

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[Claim(s)]

[Claim 1] In the migration communication system of the cellular communication system which was equipped with two or more base stations, an exchange control station, and at least one mobile station, and set up the field which can communicate from each of two or more of said base stations as a service area Migration communication system of the cellular communication system characterized by having the migration body with which it is the migration body which can connote said at least one mobile station, and the space inside the migration body concerned was set up as said imagination service area.

[Claim 2] the migration communication system of the cellular communication system characterized by performing location registration as said imagination mobile station to said base station corresponding to the service area where said two or more service areas boil said migration body, respectively, and it receives in the migration communication system of a cellular communication system according to claim 1, and is set up as an imagination mobile station, and the migration body concerned exists.

[Claim 3] In the migration communication system of a cellular communication system according to claim 2 said corresponding base station In response to the location registration as said imagination mobile station from said migration body, it reports to said exchange control station. Said exchange control station Migration communication system of the cellular communication system characterized by memorizing the positional information of said migration body as virtual mobile station location registration information in response to the report concerned from said corresponding base station with the information which shows said imagination service area set as said migration body.

[Claim 4] In the migration communication system of a cellular communication system according to claim 3 said migration body As opposed to the body internal transmigration station which is a mobile station opposite transmitter-receiver as said base station according to said imagination service area, and is said mobile station which exists in the space of said interior It is the migration communication system of the cellular communication system which is equipped with the mobile station opposite transmitter-receiver for getting down and making location registration actuation perform in a control channel, and is characterized by said body internal transmigration station performing location registration actuation to said mobile station opposite transmitter-receiver.

[Claim 5] It is the migration communication system of the cellular communication system characterized by having a base station opposite transmitter-receiver for said migration body performing location registration as said imagination mobile station to said corresponding base station in the migration communication system of a cellular communication system according to claim 4.

[Claim 6] It is the migration communication system of the cellular communication system characterized by notifying collectively the mobile station information on said body internal transmigration station by which location registration was carried out to said mobile station opposite transmitter-receiver in case said base station opposite transmitter-receiver uses said migration body as said imagination mobile station to said corresponding base station in the

migration communication system of a cellular communication system according to claim 5 and location registration is carried out.

[Claim 7] In the migration communication system of a cellular communication system according to claim 6 said corresponding base station In response to the mobile station information on said body internal transmigration station from said migration body, it reports to said exchange control station. Said exchange control station Migration communication system of the cellular communication system characterized by memorizing that said body internal transmigration station exists in said imagination service area as body internal transmigration station location registration information in response to the report concerned from said corresponding base station.

[Claim 8] Said exchange control station is the migration communication system of the cellular communication system characterized by what can be judged about whether said virtual mobile station location registration information and said body internal transmigration office location registration information to said body internal transmigration office exists in the migration communication system of a cellular communication system according to claim 7 in [ of said two or more service areas ] which service area.

[Claim 9] While dealing with the migration body concerned as an imagination mobile station about the migration body belonging to either of said two or more service areas in the migration communication system of the cellular communication system which has two or more service areas By setting up the space inside the migration body concerned as an imagination service area, and carrying out location registration of the mobile station which exists in the space inside the migration body concerned as a thing belonging to an imagination service area The mobile station which exists in the space inside said migration body if location registration of said migration body is performed even if it is the case where the service area which said migration body moves and belongs changes is the location registration approach of the mobile station characterized by not performing location registration.

[Claim 10] The location registration approach of the mobile station characterized by the ability to judge the location which is the location registration approach of a mobile station according to claim 9, and exists in the actual condition of a mobile station with the location of said migration body.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the location registration technique in the migration communication system concerned about the migration communication system of a cellular communication system.

[0002]

[Description of the Prior Art] The migration communication system of a cellular communication system sets up the field which can communicate from each base transceiver station as a small wireless zone (a cel, service area), and means the migration communication system which can offer service on the large scale of the whole country as opposed to a lot of users so that it may have two or more base transceiver stations allotted to position relation and repeat use of the same frequency may be attained on it. According to the migration communication system of this cellular communication system, even if it is the case where it moves to other cels while a subscriber talks over the telephone, since a trace switching function connects with the base station of a migration place automatically, a message is not cut. Moreover, although transmitted power of a base station and a mobile station must be enlarged and antenna height must be made high, for example by one base transceiver station when it is going to enlarge coverage area in the same electric wave, according to the migration communication system of a cellular communication system, there is such no fault. Furthermore, it can be said that it is a system with the high use effectiveness of a frequency since the same frequency can be repeated and used for the migration communication system of a cellular communication system between the base transceiver stations of other cels under the conditions which make electric-wave interference below permission of a system.

[0003] However, there were the following problems in the migration communication system of this cellular communication system.

[0004] In the migration communication system of a cellular communication system, the mobile station got down from the between under message for cutting prevention of a message, and a base station as above-mentioned, the electric wave is received, and while judging the service area where the local station exists using the signal left by the received electric wave, when it moves from a service area, location registration actuation is carried out to the base station according to the previous service area from which it moved. Moreover, the mobile station is performing location registration actuation, in order to enable next reception, even if it awaits and is inside.

[0005] By the way, in the migration communication system of a cellular communication system, the number of subscribers has been increasing quickly in recent years. Therefore, the number of the mobile stations which belong to a system with a natural thing has also been increasing. Moreover, in the migration communication system of a cellular communication system, small-scale-ization of a service area is attained from relation with output power etc.

[0006] Consequently, it would await, the count of the location registration actuation from an inner mobile station will increase, and the problem referred to as pressing the original trace message exchange had occurred.

[0007] As a technique which mitigates the burden of this location registration, the location registration method currently indicated by JP,6-319168,A (henceforth, conventional example) is proposed.

[0008] By the location registration method of the conventional example, the passing speed of a mobile station is calculated and it is supposed that the successive range of a mobile station will be further presumed based on the count result. Moreover, by the location registration method of the conventional example, when [ at which it came out of range ] presumed, suppose the mobile station that location registration actuation is performed. Thus, reduction of the count of location registration actuation is aimed at by the location registration method of the conventional example.

[0009]

[Problem(s) to be Solved by the Invention] However, by the location registration method of the conventional example, as shown below, it was hard to say that still sufficient solution is achieved about location registration actuation.

[0010] That is, in the location registration method of the conventional example, from the successive range of a mobile station being estimate, when the mobile station seceded from the presumed range so that naturally, the effectiveness that pressure of the trace message exchange can be reduced will be extinguished, and the reduction effectiveness of the count of location registration was not able to be made high.

[0011] Moreover, when a mobile station performed long-distance migration, since it was difficult, the count reduction of location registration was effective [ presuming the whole moving trucking correctly ] only to the service area group restricted by the location registration method of the conventional example. Therefore, it can be said that the location registration method of the conventional example has the narrow range which can enjoy the load reduction effectiveness by the count reduction of location registration.

[0012] Then, this invention aims at offering the location registration method in the migration communication system and the system concerned of the cellular communication system which can fully enjoy the load reduction effectiveness by the count reduction of location registration.

[0013]

[Means for Solving the Problem] In order to solve the technical problem mentioned above, the artificer of this invention paid his attention to location registration from migration bodies, such as an electric car and a bus, as a case where high effectiveness can be acquired, supposing various cases of location registration, when reduction of the number of location registration actuation was achieved.

[0014] The demands of location registration will occur all at once from many mobile stations which will move with the means of transportation concerned whenever it crosses the boundary of a service area in case the means of transportation concerned moves when the PAX of a large number which awaited to means of transportation, such as an electric car and a bus, and carried the inner mobile station has boarded. In order to process the location registration demand of these large number generated all at once, the problem referred to as that the trace message exchange to the call under original message is pressed has occurred notably.

Furthermore, although sufficient allowances for installed capacity are required in order to be easy to generate the problem concerned at the time of rushes in the mornings and evenings and to cope with the peak of this number of location registration actuation from such conditions, the investment to such installed capacity is not an economical desirable thing.

[0015] In order to solve the technical problem mentioned above, such a viewpoint to this invention existed in the space in migration bodies, such as an electric car and a bus, (henceforth, migration space), and was made into what  $(1/n)$  the count of location registration is mitigated for by representing the location registration demand from two or more sets (for example,  $n$  sets) of the mobile stations which serve as a group and move with location registration actuation of the base station opposite transmitter-receiver which a migration body has.

[0016] Specifically, this invention offers a solution means as shown below.

[0017] According to this invention, namely, as migration communication system of the 1st cellular communication system In the migration communication system of the cellular communication system which was equipped with two or more base stations, an exchange control station, and at least one mobile station, and set up the field which can communicate from each of two or more of said base stations as a service area It is the migration body which can connote said at least one mobile station, and the migration communication system of the cellular communication system characterized by having the migration body with which the space inside the migration body concerned was set up as said imagination service area is obtained.

[0018] moreover, as migration communication system of the 2nd cellular communication system, in the migration communication system of said 1st cellular communication system, said two or more service areas boil said migration body, respectively, it receives, it is set up as an imagination mobile station, and, according to this invention, the migration communication system of the cellular communication system characterized by performing location registration is obtained as said imagination mobile station to said base station corresponding to the service area where the migration body concerned exists.

[0019] According to this invention, it sets to the migration communication system of said 2nd cellular communication system as migration communication system of the 3rd cellular communication system. Moreover, said corresponding base station In response to the location registration as said imagination mobile station from said migration body, it reports to said exchange control station. Said exchange control station The migration communication system of the cellular communication system characterized by memorizing the positional information of said migration body as virtual mobile station location registration information in response to the report concerned from said corresponding base station with the information which shows said imagination service area set as said migration body is obtained.

[0020] According to this invention, it sets to the migration communication system of said 3rd cellular communication system as migration communication system of the 4th cellular communication system. Furthermore, said migration body As opposed to the body internal transmigration station which is a mobile station opposite transmitter-receiver as said base station according to said imagination service area, and is said mobile station which exists in the space of said interior It has a mobile station opposite transmitter-receiver for getting down and making location registration actuation perform in a control channel, and the migration communication system of the cellular communication system characterized by said body internal transmigration station performing location registration actuation to said mobile station opposite transmitter-receiver is obtained.

[0021] Moreover, according to this invention, in the migration communication system of said 4th cellular communication system, the migration communication system of the cellular communication system characterized by equipping said migration body with the base station opposite transmitter-receiver for performing location registration as said imagination mobile station to said corresponding base station is obtained as migration communication system of the 5th cellular communication system.

[0022] According to this invention, it sets to the migration communication system of said 5th cellular communication system as migration communication system of the 6th cellular communication system. Moreover, said base station opposite transmitter-receiver In case it carries out location registration to said corresponding base station, using said migration body as said imagination mobile station, the migration communication system of the cellular communication system characterized by notifying collectively the mobile station information on said body internal transmigration station by which location registration was carried out to said mobile station opposite transmitter-receiver is obtained.

[0023] According to this invention, it sets to the migration communication system of said 6th cellular communication system as migration communication system of the 7th cellular communication system. Moreover, said corresponding base station In response to the mobile station information on said body internal transmigration station from said migration body, it reports to said exchange control station. Said exchange control station The migration

communication system of the cellular communication system characterized by memorizing that said body internal transmigration station exists in said imagination service area as body internal transmigration station location registration information in response to the report concerned from said corresponding base station is obtained.

[0024] Furthermore, according to this invention, in the migration communication system of said 7th cellular communication system, the migration communication system of a cellular communication system with which said exchange control station is characterized by what said body internal transmigration office can judge about whether it exists in [ of said two or more service areas ] which service area from said virtual mobile station location registration information and said body internal transmigration office location registration information is obtained as migration communication system of the 8th cellular communication system.

[0025] In addition, although the 1st thru/or the migration communication system of the 8th cellular communication system were enumerated above, as long as the location registration approach as shown below is used for the concept of this invention, they may be other gestalten.

[0026] Namely, according to this invention, it sets to the migration communication system of the cellular communication system which has two or more service areas as the location registration approach of a mobile station. While dealing with the migration body concerned as an imagination mobile station about the migration body belonging to either of said two or more service areas By setting up the space inside the migration body concerned as an imagination service area, and carrying out location registration of the mobile station which exists in the space inside the migration body concerned as a thing belonging to an imagination service area If location registration of said migration body is performed even if it is the case where the service area which said migration body moves and belongs changes, the location registration approach of the mobile station characterized by the mobile station which exists in the space inside said migration body not performing location registration will be acquired.

[0027] Here, the location which exists in the actual condition of a mobile station can be judged with the location of said migration body.

[0028]

[Embodiment of the Invention] Below, the migration communication system of the cellular communication system of the gestalt of operation of this invention is explained.

[0029] As the migration communication system of the cellular communication system of the gestalt of operation of this invention is equipped with two or more base stations, an exchange control station, 1 or two or more mobile stations, and a migration body, it is constituted.

[0030] The frequency of 1 chosen from two or more frequencies is assigned to two or more base stations the base station of adjoining others, etc. and under the conditions which interference does not produce, respectively. The field which can communicate from the base station concerned with this assigned frequency is set up as a service area, respectively. Therefore, two or more base stations are equivalent to the service area of 1, respectively. In addition, the service area is usually set up, as the edge laps with other service areas.

[0031] Generally, from the base station corresponding to the service area which belongs, each mobile station receives a control channel, and whenever the service area which belongs changes, it performs location registration actuation to the base station which newly [ a local station ] corresponds. When located in the edge of the service area where a mobile station belongs in detail, the receiving level of the control channel which can receive by the mobile station side deteriorates from a predetermined value. Since the service area and edge where a service area adjoins each other are set up as above-mentioned in that case as it laps, a mobile station can find the service area which can receive a control channel with receiving level higher than the service area which was carrying out the present group. Thus, if the service area which should newly be carried out a group is found, a mobile station will perform location registration actuation to the base station corresponding to the service area which should newly be carried out a group.

[0032] Migration bodies are means of transportation, such as an electric car and a bus, and can



connote at least one mobile station to the interior.

[0033] The migration body in the gestalt of this operation is equipped with the mobile station opposite transmitter-receiver as a base station corresponding to an imagination service area, and the space of the interior is set up as an imagination service area. To the mobile station (the mobile station which consists in the interior of a migration body is hereafter called body internal transmigration station.) included in the interior of a migration body, it gets down and a mobile station opposite transmitter-receiver transmits a control channel. Therefore, when the receiving level of the control channel from the base station corresponding to the service area which belonged till then deteriorates after the body internal transmigration station went into the interior of a migration body, by the completely same principle as the above-mentioned actuation, a body internal transmigration station will get down from a mobile station opposite transmitter-receiver, will receive a control channel, and will belong to an imagination service area. That is, location registration actuation from a body internal transmigration station is conventionally performed to the mobile station opposite transmitter-receiver with which a migration body is equipped among the location registration actuation which all the mobile stations were performing. However, in the gestalt of this operation, since the location registration actuation itself is based on the same principle, a body internal transmigration station does not need special equipment.

[0034] Moreover, the migration body in the gestalt of this operation is equipped with the base station opposite transmitter-receiver for performing location registration to the base station corresponding to the service area where a migration body belongs. like a common mobile station, the base station opposite transmitter-receiver has mobile station information (migration body information), two or more service areas (or two or more base stations) boil it, respectively, receives, and is set up as an imagination mobile station. Here, since an imagination mobile station is a thing on a concept, as the object, it is good also as pointing out only a base station opposite transmitter-receiver, and good also as pointing out the whole migration body. Moreover, it connects with the mobile station opposite transmitter-receiver, in case a base station opposite transmitter-receiver performs location registration concerning a migration body in the information on the body internal transmigration station by which location registration was carried out to the mobile station opposite transmitter-receiver (body internal transmigration station information), it is accompanied by it, and it is sent out to a corresponding base station. Here, it is not necessary to send out from relation with the exchange control station mentioned later about what is already sent out to the last base station among body internal transmigration office information.

[0035] An exchange control station performs the following processings from the base station corresponding to a migration body in response to the information about the information (following and migration body information) about the location registration of a migration body, and body internal transmigration station information. An exchange control station will generate and memorize the virtual mobile station location registration information which consists of information which shows the service area where a migration body belongs, and information which shows the imagination service area set as the space inside a migration body, if migration body information is received. Moreover, an exchange control station will generate and memorize body internal transmigration station location registration information from the information which shows an imagination service area, if such body internal transmigration station information is received. Unless new location registration is performed by [ in which it gets down and the receiving level of a control channel deteriorates ], as for body internal transmigration station location registration information, body internal transmigration station information's coming out from the space inside a migration body, and being sent out from a mobile station opposite transmitter-receiver in the gestalt of this operation so that I may be understood from these things, the service area where a body internal transmigration station belongs is an imagination service area, and it is not necessary to change it. Therefore, once it will be sent out, the body internal transmigration station information about the body internal transmigration station which finished location registration within the migration body is compared, and even if it changes the

service area where a migration body belongs, as long as the body internal transmigration station belongs to the imagination service area, it is not necessary to send it out.

[0036] Therefore, in the gestalt of this operation, a deployment of a channel is achieved and other business in an exchange control station is not suppressed.

[0037] Actuation of the migration communication system of the cellular communication system in the gestalt of this operation which equipped below with such a configuration is explained.

[0038] The body internal transmigration station included in the space inside a migration body performs location registration actuation ignited by level degradation of the control channel under prehension, when migration space moves to a service area boundary. Under the present circumstances, location registration actuation chooses the control channel which can receive on the maximum level from the control channel groups sent out from each base station corresponding to each service area, and is performed by sending out the mobile station information on a local station to the base station which has sent out that control channel. Here, since the body internal transmigration office included in the space inside a migration body consists in the imagination service area as mentioned above, it can get down from the mobile station opposite transmitter–receiver with which the migration body was equipped, and can receive a control channel on the maximum level. Therefore, a body internal transmigration station performs location registration actuation to a mobile station opposite transmitter–receiver. Henceforth, since level degradation of the control channel which has received does not take place until it comes out of the space inside a migration body, a body internal transmigration office does not need to perform location registration actuation. for this reason – for example, even if it changes the service area where a metaphor and a migration body belong as long as there are these  $n$  sets of body mobile stations in an imagination service area when  $n$  sets of body internal transmigration stations exist in the space inside a migration body, a location registration demand is not performed and the burden of location registration actuation for  $n$  sets is mitigated. The body internal transmigration station information on a body internal transmigration station that location registration was carried out to the mobile station opposite transmitter–receiver is notified to an exchange control station through a corresponding base station by the base station opposite transmitter–receiver with which the migration body was equipped, with the information which shows an imagination service area, is memorized by the exchange control station as body internal transmigration station location registration information, and is managed.

[0039] On the other hand, in case a migration body moves across a service area boundary, it performs location registration actuation as an imagination mobile station like a common mobile station by the base station opposite transmitter–receiver. Through a corresponding base station, the migration body information on the migration body by which location registration was carried out is notified to an exchange control station, with the information which shows the information which shows an imagination service area, and the actual service area which belongs by the exchange control station, is memorized as virtual mobile station location registration information, and is managed. Henceforth, if an exchange control station has the location registration demand from a migration body, it will update the information which shows the service area where a migration body exists. Here, since it is the same natural [ the information which shows the imagination service area included in body internal transmigration office location registration information, and the information which shows the imagination service area included in virtual mobile station location registration information ], it can link mutually. It is also possible for this to judge the actual service area of body internal transmigration station location registration information which belongs.

[0040] Since it is represented by actuation which was explained above by the location registration actuation which consists in the interior of a migration body and to which  $n$  sets of location registration actuation are carried out using a base station opposite transmitter–receiver from a migration body, for example, as compared with the former, the degree by which an exchange control station side is pressed decreases to  $1/n$ .

[0041] In addition, in case a body internal transmigration station comes out from the space

inside a migration body, in order that it may get down from the caught mobile station opposite transmitter-receiver and a control channel may cause level degradation, it is a body internal transmigration station (although it is needless to say). in fact, if it comes out from internal space, it will be a mere common mobile station only by names differing. Location registration actuation will be performed, the control channel from a nearby base station is caught, and it returns to the actuation in the conventional cellular communication system.

[0042] Since it can represent with location registration actuation of the base station opposite transmitter-receiver to which a migration body equips the interior of a migration body with the location registration actuation from two or more body internal transmigration offices which carries out a \*\* area by dealing with the space inside a migration body as an imagination service area according to the gestalt of this operation as explained above, the migration communication system of a cellular communication system with which count reduction of location registration was fully achieved is obtained. In addition, it is providing the function and means mentioned above to an infrastructure side the body internal transmigration station's just being equipped with the same configuration as the mobile station used by the conventional cellular communication system, and desired effectiveness is acquired so that I may be understood from the above-mentioned explanation.

[0043]

[Example] As an example, a drawing is used for below and concrete explanation is given to it in order to deepen an understanding of this invention further.

[0044] Drawing 1 shows the system tree of the migration communication system of the cellular communication system in this example. As the migration communication system of the cellular communication system of this example is equipped with the electric car 9 as two or more base stations 4-6, the exchange control station 7, and a migration body, it is constituted so that I may be understood, if drawing 1 is referred to. Two or more base stations 4-6 take charge of each of service areas 1-3. Moreover, in drawing 1, it is the moving trucking of an electric car 9 which is expressed with a reference mark 8, and it is the station which is expressed with a reference mark 10. Furthermore, in drawing 1, it is the common mobile station which is expressed with a reference mark 19.

[0045] Drawing 2 shows the condition of the configuration of an electric car 9, and the space of the interior. The electric car 9 is equipped with the base station opposite antenna 21 which counters a base station, the base station opposite transmitter-receiver 23, the mobile station opposite transmitter-receiver 24, and the mobile station opposite antenna 22 that counters the mobile station inside an electric car so that I may be understood, if drawing 2 is referred to. The body internal transmigration stations 27-29 currently carried by the PAX who got into [ an electric car 9 ] exist in the space of the electric-car 9 interior.

[0046] Drawing 3 shows change of the field strength at the time of an electric car 9 moving in a moving trucking 8 top. What what what is shown by the reference mark 31 shows the field strength by the service area 1, and is shown by the reference mark 32 shows the field strength by the service area 2, and is shown by the reference mark 33 shows the field strength by the service area 3. A reference mark 34 shows the field strength of the electric-car 9 interior as an imagination service area. Moreover, when the reference mark 35 has received the control channel with the mobile station, it shows the receiving level judged to be receiving level degradation.

[0047] Drawing 4 is the block diagram showing the configuration of the base station opposite transmitter-receiver 23 with which an electric car 9 is equipped, and the mobile station opposite transmitter-receiver 24. The base station opposite transmitter-receiver 23 is equipped with the base station opposite transceiver section 41 and the base station opposite control section 42, and the mobile station opposite transmitter-receiver 24 is equipped with the mobile station opposite transceiver section 44 and the mobile station opposite control section 43 so that I may be understood, if drawing 4 is referred to. The base station opposite transceiver section 41 is for transmitting and receiving through the base station opposite antenna 21 between base stations, and the transceiver contents etc. are controlled by the base station

opposite control section 42. The base station opposite control section 42 is for performing location registration as an imagination mobile station, or transmitting the body internal transmigration station information on the body internal transmigration station received from the mobile station opposite control section 43 to a corresponding base station through the base station opposite transceiver section 41 and the base station opposite antenna 21. Moreover, the base station opposite control section 42 receives the actual service areas 1–3 sent out from the exchange control station 7, and the adjusted system parameter from a nearby base station through the base station opposite transceiver section 41. The mobile station opposite transceiver section 44 is for transmitting and receiving between body internal transmigration stations through the mobile station opposite antenna 22, and the transceiver contents etc. are controlled by the mobile station opposite control section 43. The mobile station opposite control section 43 has the protocol equivalent to the protocol of base stations 4–6, and it sends out the body internal transmigration station information received from the body internal transmigration station through the transceiver section 44 to the base station opposite control section 42 while it gets down to a body internal transmigration station through the mobile station opposite transceiver section 44 and it transmits a control channel using this parameter.

[0048] Drawing 5 is the mobile station location registration memory provided in an exchange control station, and shows the configuration of the mobile station location registration memory for storing virtual mobile station location registration information and body internal transmigration office location registration information, and the location registration information on a common mobile station. Mobile station location registration memory is equipped with the memory area 58 for memorizing the virtual mobile station location registration information as an imagination mobile station of an electric car 9, and the memory area 59 for memorizing the location registration information and body internal transmigration station location registration information about a common mobile station. A memory area 58 is equipped with the data area 53 for memorizing the virtual service area number which shows the data area 52 for memorizing the migration body information which is the information for distinguishing that systems, such as a data area 51, and the telephone number, a serial number for memorizing the service area number which shows the service area where the electric car 9 actually belongs as an imagination mobile station, are right subscribers, and the imagination service area set as the space of the electric-car 9 interior. The memory area 59 is equipped with the data area 55 for storing the mobile station information or body internal transmigration station information which is the information for distinguishing that systems, such as the telephone number, a serial number, etc. of a mobile station or a body internal transmigration station, are right subscribers from the data area 54 for storing the service area number which shows the service area where the mobile station or the body internal transmigration station belongs, or 56, or 57.

[0049] The location registration actuation in an outline and the migration communication system of the cellular communication system of this example equipped with such a configuration is explained using above-mentioned drawing 1 thru/or above-mentioned drawing 5 below. In addition, although the physical relationship in drawing 1 will differ somewhat on account of explanation, an electric car 9 shall be an initial state, shall be located in space top right-hand side rather than a station 10 in drawing 1, and shall move toward left-hand side from space right-hand side. Moreover, the body internal transmigration station 27 calls it a mobile station 27 between the body internal transmigration station 27, a call, and others until it stops belonging to an imagination service area after presupposing that it is what the user who got into [ an electric car 9 ] is carrying and belonging to an imagination service area in the following explanation from a station 10.

[0050] The user of a mobile station 27 is going to take an electric car 9 at the station 10 in a service area 3, and go in the direction with a service area 1. Since the \*\* area of the mobile station 27 currently carried by the user concerned with the natural thing is carried out to the service area 3 in the initial state, the control channel 15 from a base station 6 is caught, and it is remembered in the exchange control station 7 that it exists in the service area 3. When a user arrives at a point 17 after taking an electric car 9 at a station 10, a mobile station 27

starts the actuation which looks for the control channel which can receive on the maximum level in connection with the receiving level of the control channel 15 which had received from the base station 6 deteriorating. Here, the mobile station opposite transmitter-receiver 24 with which an electric car 9 is equipped gets down to the space of the electric-car 9 interior towards in the car, the area information about an imagination service area is passed by the control channel 25, and a mobile station 27 catches the going-down control channel 25 which is a control channel of the maximum level among the control channels which can receive, considers that the mobile station opposite transmitter-receiver 24 is an imagination base station, and performs location registration actuation.

[0051] Hereafter, a view is changed using drawing 1 and drawing 3, and the relation between received field strength and the location of a mobile station 27 explains. The mobile station 27 which went into the space of the electric-car 9 interior at the point 36 has caught the control channel 15. Since a control channel 15 will deteriorate to the degradation reference level 35 used as the criteria of location registration actuation when an electric car 9 moves to a point 37, a mobile station 27 will start the actuation which looks for the control channel which can receive on the maximum level. Here, the receiving level of the control channel 13 from a base station 5 is the 1st level 39, and on the other hand, it gets down from the mobile station opposite transmitter-receiver 24, and since the receiving level of a control channel 25 is the 2nd level 38, a mobile station 27 performs location registration actuation to the mobile station opposite transmitter-receiver 24. Henceforth, even if it reaches the point 18 whose electric car 9 is the next service area boundary since [ in an electric car 9 ] it gets down and a control channel 25 can always receive on the 2nd level 38 even if an electric car 9 moves along with moving trucking 8, the body internal transmigration station 27 does not cause location registration actuation. Like [ other body internal transmigration stations 28 and 29 ] the body internal transmigration station 27, once it is performing location registration actuation to the mobile station opposite transmitter-receiver 24, location registration actuation will not be performed.

[0052] Next, actuation of the mobile station 27 at the time of the user who carries a mobile station 27 getting off from an electric car 9 at the station (not shown) in a service area 1 is explained.

[0053] If it comes out outside from the space in an electric car 9 at the station in a service area 1, since it will get down from the mobile station opposite transmitter-receiver 24 and the receiving level of a control channel will deteriorate degradation reference level 35, the body internal transmigration station 27 catches the control channel 11 which can receive on the maximum level, and performs location registration to a service area 1.

[0054] While existing in the space of the electric-car 9 interior, it is only performing location registration to the space in the electric car 9 as an imagination service area once, and as explained above, the body internal transmigration office 27 does not need to perform location registration until the user of the body internal transmigration office 27 gets off in an electric car 9. Moreover, location registration actuation will be continuously performed also to the getting-on-and-off vehicle of the user who carries a mobile station 27, and trouble is not caused to service.

[0055] Next, actuation of the electric car 9 in the system concerned is explained. The exchange control station 7 sends the actual service areas 1-3 and the adjusted system parameter through a message channel to an electric car 9 via a nearby base station. For example, in the condition that it is shown in drawing 1, the exchange control station 7 sends service areas 1-3 and the adjusted system parameter to an electric car 9 through a message channel 14 via a base station 5. The mobile station opposite control section 43 with which an electric car 9 is equipped has the protocol equivalent to the protocol of base stations 4-6, reports the system parameter of the service area where an electric car 9 belongs as an imagination mobile station to the body internal transmigration stations 27-29 using this parameter by the control channel 25, generates the body internal transmigration station information on the body internal transmigration station which carried out location registration actuation, and passes it to the

base station opposite control section 42. The base station opposite control section 42 once accumulates the body internal transmigration station information received from the mobile station opposite control section 43, and sends it to the exchange control station 7 via the nearby base station 5 through a message channel 14 to predetermined timing. All the body internal transmigration station information on the body internal transmigration station which exists in the space of the electric-car 9 interior in the above actuation is memorized by the exchange control station 7. Since it can be considered that the base station opposite transmitter-receiver 23 with which an electric car 9 is equipped is what has the telephone number etc. and has the same function as a mobile station, it continues explanation as an imagination mobile station 23. After an electric car's 9 leaving a station 10, if it arrives at a point 17 and a point 18, the imagination mobile station 23 will catch control channels 13 and 11, respectively, and location registration will be carried out as a thing belonging to a service area 2 and a service area 1.

[0056] Next, the data memorized by the mobile station location registration memory with which the exchange control station 7 is equipped are explained. The positional information of the common mobile station 19 shown in drawing 1 is memorized by the memory area 59. Since the mobile station 19 is carrying out the \*\* area to the service area 2, 2 which is a service area number is memorized by the data area 54, and the mobile station information on a mobile station 19 is memorized by the data area 55. The positional information of the imagination mobile station 23 with which the electric car 9 was equipped is memorized by the memory area 58 as virtual mobile station location registration information. Since the imagination mobile station 23 is carrying out the \*\* area to the service area 2, 2 which is a service area number is memorized by the data area 51, and the migration body information which is the mobile station information on the imagination mobile station 23 is memorized at the data area 52. Furthermore, the number A which shows the imagination service area currently assigned to the space in an electric car 9 is memorized by the data area 53. Here, the service area number memorized by the data area 51 is updated like it in a common mobile station, when the service area where the imagination mobile station 23 belongs changes with migration of the imagination mobile station 23. The positional information of the body internal transmigration station 27 is memorized by the memory area 59 as body internal transmigration station location registration information. Since the body internal transmigration station 27 is carrying out the \*\* area to the imagination service area, the number A which shows an imagination service area is memorized by the data area 56, and the body internal transmigration station information on the body internal transmigration station 27 is memorized by the data area 56. Thus, when the exchange control station 7 receives a message to the body internal transmigration station 27 according to the information memorized by each memory area, mobile station location registration memory is investigated, the body internal transmigration station information memorized by the data area 57 is discovered from a memory area 59, and the service area where the body internal transmigration station 27 belongs reads that it is the imagination service area shown by the number A from a data area 56. Next, the exchange control station 7 calls that an imagination service area is in a service area 2 in fact from the data areas 51 and 53 of a memory area 58. By such actuation, the exchange control station 7 knows that the body internal transmigration station 27 will move in the inside of the actual service area 2, and directs the arrival to the body internal transmigration station 27, and the shift to the message channel 14 after call-in processing termination to a mobile station 23 by the control channel 13. The body internal transmigration station 27 starts a message by the receipt and the message channel 14 in the directions from the exchange control station 7 via the mobile station opposite transmitter-receiver 24.

[0057]

[Effect of the Invention] As explained above, when represented by  $n$  set ( $n$  is two or more integers) actuation of the location registration of the base station opposite transmitter-receiver with which a migration body is equipped by location registration actuation of an inner mobile station by awaiting, according to this invention, the effectiveness of decreasing to  $1/n$  is acquired in the migration communication system of a cellular communication system.

[0058] Furthermore, according to this invention, the successive range of a mobile station is not presumed from prediction count like the conventional example, but the migration communication system of the cellular communication system which can enjoy the effectiveness mentioned above in a stably wide range service area group is obtained from using the location registration actuation from the actually generated base station opposite transmitter-receiver.

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[Translation done.]

**\* NOTICES \***

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] The system tree of the migration communication system of the cellular communication system by the example of this invention is shown.

[Drawing 2] It is drawing showing the system configuration inside a migration body.

[Drawing 3] It is drawing showing the field strength change on moving trucking.

[Drawing 4] It is drawing showing the configuration of a base station opposite transmitter-receiver and a mobile station opposite transmitter-receiver.

[Drawing 5] It is drawing showing the configuration of mobile station location registration memory.

**[Description of Notations]**

- 1 Service Area
- 2 Service Area
- 3 Service Area
- 4 Base Station
- 5 Base Station
- 6 Base Station
- 7 Exchange Control Station
- 8 Moving Trucking
- 9 Electric Car
- 10 Station
- 11 Control Channel
- 12 Message Channel
- 13 Control Channel
- 14 Message Channel
- 15 Control Channel
- 16 Message Channel
- 17 Point
- 18 Point
- 19 Mobile Station
- 21 Base Station Opposite Antenna
- 22 Mobile Station Opposite Antenna
- 23 Base Station Opposite Transmitter-receiver (Imagination Mobile Station)
- 24 Mobile Station Opposite Transmitter-receiver
- 25 Control Channel
- 26 Message Channel
- 27 Mobile Station in Body
- 28 Mobile Station in Body
- 29 Mobile Station in Body
- 31 Field Strength
- 32 Field Strength
- 33 Field Strength



34 Field Strength  
35 Degradation Reference Level  
36 Point  
37 Point  
38 2nd Level  
39 1st Level  
40 Level  
41 Base Station Opposite Transceiver Section  
42 Base Station Opposite Control Section  
43 Mobile Station Opposite Control Section  
44 Mobile Station Opposite Transceiver Section  
51 Data Area  
52 Data Area  
53 Data Area  
54 Data Area  
55 Data Area  
56 Data Area  
57 Data Area  
58 Memory Area  
59 Memory Area

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[Translation done.]

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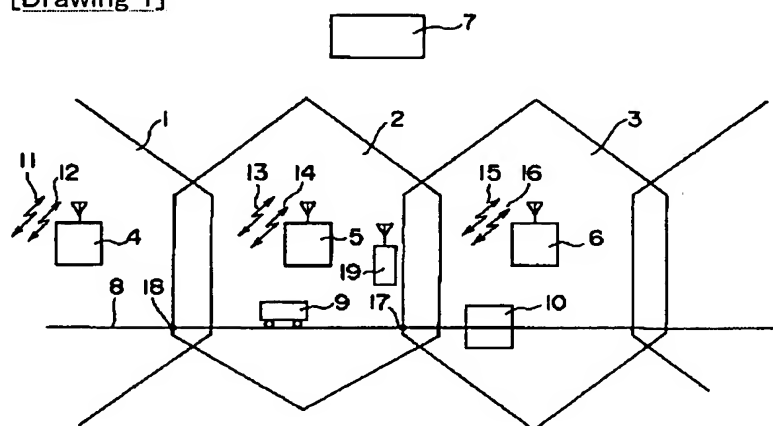
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2.\*\*\*\* shows the word which can not be translated.

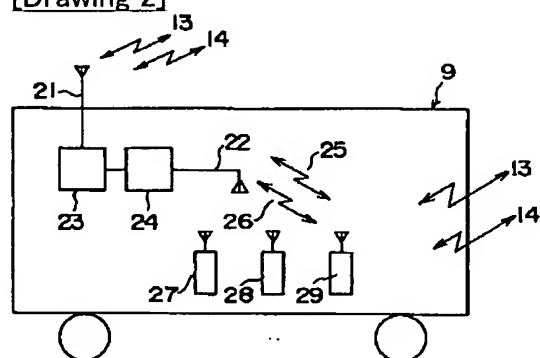
3.In the drawings, any words are not translated.

## DRAWINGS

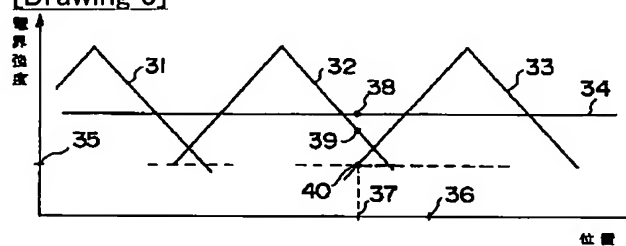
[Drawing 1]



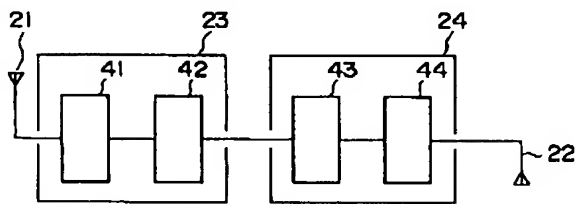
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Drawing 5]

51	52	53	
2	移動局 2 3 の移動局情報	A	58
	⋮		

54	55	
2	移動局 1 9 の移動局情報	59
	⋮	
A	移動局 2 7 の移動局情報	
56	57	

[Translation done.]